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WHAT IS CLAIMED:

1. A method of removing substantially all of the volatile component in a green, volatile-containing gel-cast ceramic article cast from a gel-casting slurry, the method comprising the steps of:

(a) providing the gel-casting slurry;

(b) casting the article from the gel-casting slurry in a mold;

(c) gelling the gel-casting slurry to form the gel-cast ceramic article in the mold;

(d) releasing the gel-cast ceramic article from the mold;

(e) freezing the gel-cast ceramic article after releasing the gel-cast ceramic article from the mold; and

(f) subjecting the frozen gel-cast ceramic article to a vacuum for a sufficient time to freeze-dry the gel-cast ceramic article.

2. The method of claim 1, wherein the volatile component in the green ceramic article is selected from the group consisting of water, an organic solution, or a mixture of water and an organic solution.

3. The method of claim 1, wherein the volatile component comprises at least one material selected from the group consisting of water, cyclohexane, tert-butyl alcohol, and mixtures which include at least one of these materials.

4. The method of claim 1, wherein freezing of the ceramic article is carried out in a freeze dryer.

5. The method of claim 1, wherein the vacuum applied in step (b) is in the range of about 50 mtorr to about 500 mtorr.

6. The method of claim 1, wherein the ceramic article in step (a) is initially brought to a minimum temperature of at least about 10 degrees Centigrade below the freezing point of the volatile component.

7. The method of claim 6, wherein the temperature of the ceramic article is gradually increased during step (b), from the minimum temperature to at least the freezing point of the volatile component.

8. The method of claim 1, wherein the volatile component in the ceramic article is brought down to at least its freezing point in step (a), and the temperature of the ceramic article is gradually increased during step (b), from its freezing point to a temperature of at least about 20°C.

9. The method of claim 8, wherein the temperature of the ceramic article is gradually increased during step (b), to a temperature of at least about 35°C.

10. The method of claim 8, wherein the temperature of the ceramic article is gradually increased at a rate of about 2°C to about 6°C per hour.

11. The method of claim 1, wherein the green ceramic article is allowed to partially dry in a relative humidity chamber, prior to step (a).

12. The method of claim 1, wherein the article is formed from at least one ceramic material selected from the group consisting of alumina, alumina-aluminum, silica, zirconia, zircon, silica-zircon, silicon carbide, silicon nitride, magnesium oxide, and mixtures which include at least one of these components.

13. The method of claim 1, wherein the article is a ceramic core.

14. The method of claim 13, wherein the ceramic core is formed from at least one material selected from the group consisting of silica, alumina, aluminum-alumina, zircon, and mixtures which include at least one of these materials.

15. The method of claim 1, wherein the ceramic article is formed from an extrusion technique or an injection molding technique.

16. The method of claim 1, wherein the ceramic article is formed from a casting technique.

17. The method of claim 16, wherein the casting technique is gel casting, and the article is formed from a gel-casting slurry.

18 The method of claim 1, wherein the gel-casting slurry comprises at least one material selected from the group consisting of alumina, alumina-aluminum, silica, zirconia, zircon, silica-zircon, silicon carbide, silicon nitride, magnesium oxide, and mixtures which include at least one of these components.

19. The method of claim 1, wherein the gel-casting slurry comprises at least one material selected from the group consisting of alumina, aluminum-alumina, zircon, and mixtures which include at least one of these components.

20. The method of claim 1, wherein the gel-casting slurry comprises water and a gel-casting binder.

21. The method of claim 20, wherein the binder is selected from the group consisting of acrylates, acrylamide-based monomers, and combinations thereof.

22. The method of claim 20, wherein the gel-casting slurry further comprises at least one component selected from the group consisting of a deflocculant and a plasticizer.

23. The method of claim 1, wherein the article is a ceramic core.

24. The method of claim 23, wherein the ceramic core is formed from at least one material selected from the group consisting of silica, alumina, aluminum-alumina, zircon, and mixtures which include at least one of these components.

25. A method for fabricating a gel-cast ceramic article suitable for use as a core in the investment casting of directionally solidified eutectic and superalloy materials, the method comprising the steps of:

(i) preparing a ceramic slurry which comprises:

(A) at least one ceramic component, and

(B) a solution of a polymerizable binder in a liquid;

(ii) forming the slurry into a gel-cast green product of an article-shaped body;

(iii) allowing the slurry to gel;

(iv) releasing the gel-cast green product from the mold;

(v) freezing the gel-cast green product after releasing the gel-cast ceramic article from the mold;

(vi) subjecting the frozen product to a vacuum for a sufficient time to freeze-dry the product; and

(vii) heating the gel-cast green product in an oxygen-containing atmosphere to form a sintered ceramic article.

26. The method of claim 25, wherein the temperature of the ceramic article is gradually increased during step (v), from a freezing temperature to a temperature of at least about 20°C.

27. The method of claim 25, wherein the weight ratio of alumina to aluminum within the slurry is within the range of about 20:1 to about 5:2.

28. The method of claim 25, wherein the alumina is fused alumina.

29. The method of Claim 25, wherein the at least one ceramic component comprises at least one of silica and a mixture of alumina and aluminum.